

WE CLAIM:

1. A method for radiolabeling precursor chemical compounds comprising the steps of:
 - 5 - injecting a sample comprising a precursor chemical compound, into an injection loop of a high performance liquid chromatograph (HPLC);
 - injecting a radiolabeling reagent into the injection loop;
 - allowing the radiolabeling reagent to react with the precursor chemical compound, to provide a reaction mixture comprising a radiolabeled compound;
 - 10 - injecting the reaction mixture into the HPLC column; and
 - isolating the radiolabeled compound.
2. The method according to claim 1, wherein the radiolabeling reagent is a volatile and condensable compound.
 - 15 3. The method according to claim 2, wherein the radiolabeling reagent is selected from the group consisting of [¹¹C]-ethyl iodide, [¹¹C]-propyl iodide, [¹¹C]-methyl iodide and [¹¹C]-acetyl iodide.
 - 20 4. The method according to claim 3, wherein the radiolabeling reagent is [¹¹C]-methyl iodide.
 5. The method according to claim 1, wherein the precursor chemical compound is in the form of an acid salt and the sample further comprises a base.
 - 25 6. The method according to claim 4, wherein the [¹¹C]-iodomethane is reacted with the precursor chemical compound for about 0.5 to about 20 minutes.
 - 30 7. The method according to a claim 1, wherein the precursor chemical

compound is dissolved in a solvent.

8. The method according to claim 1, wherein the sample further comprises a catalyst.

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9. A radiolabeled compound prepared using a method according to claim 1.

10. A [¹¹C]-methylated compound prepared using a method according to claim 4.

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